39. The device of claim 38, wherein the first dielectric film comprises two or more dielectric layers with mutually different dielectric constants.

B1 cont'd

40. The device of claim 38, further comprising an active component operable at radio frequencies on the semiconductor substrate, the active component being electrically connected to the coplanar conductor layer.--

REMARKS

Claims 23-40 are pending in this application. By this amendment, the specification and Figures 10-16 are amended, claims 1-22 are canceled, and new claims 23-40 are added.

Support for the new claims can be found in Applicants' specification as follows: claims 23 and 28, on at least page 16, lines 13-18; claim 24, on at least page 16, lines 20-22; claims 35 and 38, on at least page 28, lines 3-12, and Fig. 7; and claim 36, on at least page 30, lines 20-25, and Fig. 7. In addition, new claim 23 contains original claim 1; new claim 28 contains original claims 6, 10 and 12; new claim 34 contains original claim 11; new claim 35 contains original claim 16; and new claim 38 contains original claims 19 and 20.

Applicant notes that in paragraph 2 of the Office Action, the Examiner asserts that on page 6, line 6, "Figures" should be replaced with --Figure--. However, Applicant is unable to find any such term on page 6, line 6. And below this should be page 14, line 6, which has been corrected. Further clarification if necessary is requested.

Reconsideration in view of the above amendments and following remarks is respectfully solicited.

I. THE CLAIMS DEFINE PATENTABLE SUBJECT MATTER

The Office Action rejects: **(1)** claims 9-15 and 19-22 under 35 U.S.C. §102(e) as anticipated by U.S. Patent No. 6,046,503 to Weigand et al.; **(2)** claims 1-13 under 35 U.S.C. §103 as unpatentable over U.S. Patent No. 5,567,982 to Bartelink; and **(3)** claims 16-18 and 20-22 under 35 U.S.C. §103 as unpatentable over Wakimoto et al. in view of Weigand et al. These rejections are respectfully traversed.

Applicant respectfully submits that the above noted rejections are moot in light of the cancellation of claims 1-22. Accordingly, withdrawal of the rejection of claims 1-22 is respectfully solicited.

New claim 23 recites, *inter alia,* a semiconductor device comprising a structure in which a conductor line is formed over a grounded conductor layer with a dielectric film interposed therebetween such that the conductor line is opposite to the conductor layer. By comprising this structure, the device can exhibit the function of a micro-strip line for transmitting a radio frequency signal. Specifically, the conductor line and the grounded conductor layer cause an electromagnetic interaction, thereby allowing a radio frequency signal to transmit through the conductor line. As such, claim 23 is directed to at least a micro-strip line structure for transmitting a radio frequency signal.

One of the novel features of claim 23 resides in that the dielectric film comprises a first dielectric portion interposed between the conductor layer and the conductor line and a second dielectric portion which is formed on a side face of the first dielectric portion and has a different dielectric constant from that of the first dielectric portion. As a result, it is possible to easily control an impedance of the conductor line, thereby shortening a line length.

New claim 28 is directed to a micro-strip line structure for transmitting a radio frequency signal, similar to claim 23. Claim 28 recites, *inter alia,* the same basic structure as in claim 23. However, one of the novel features of claim 28 resides in that the dielectric film comprises two or more dielectric layers. By controlling the thicknesses of the dielectric films independently of each other, it is possible to reduce a capacitance and shorten an electrical length of the whole line structure.

New claim 34 is directed to a micro-strip line structure for transmitting a radio frequency signal. Claim 34 recites, *inter alia,* a structure in which a conductor line is formed over a conductor layer with a dielectric film interposed therebetween, such that the conductor layer runs in accordance with a configuration of the conductor line. By comprising this structure, the device can exhibit the function of a micro-strip line for transmitting a radio frequency signal. Specifically, the conductor line and the grounded conductive layer cause an electromagnetic interaction, thereby allowing a radio frequency signal to transmit through the conductor line.

Furthermore, claim 34 contains some of the same novel features as contained in claim 28, and thus produces the same advantages. In addition, in the claimed structure of claim 34, the

conductor layer is not present in at least a portion of a region below the conductor line. As a result, it is possible to further shorten an electrical length of the whole line structure.

New claim 35 recites, *inter alia,* a semiconductor device comprising a "coplanar-type" line structure for transmitting a radio frequency signal (corresponding to the claimed coplanar conductor layer), different type from the "micro-strip" type as in claims 23, 28 or 34. In the coplanar conductor layer as recited, a conductor line and two conductor layers are formed over a semiconductor substrate such that the conductor layers extend along the conductor line on opposite sides of the conductor line, each with a distance from the conductor line, each of which is applied with a ground potential. The conductor line and the conductive layers cause a magnetic interaction, thereby allowing a radio frequency signal to transmit through the conductor line.

One of the novel features of claim 35 resides in that a dielectric film which is formed so as to cover the coplanar conductive layer, has a dielectric constant larger than 10. This makes it possible to shorten a line length.

New claim 38 is at least directed to a coplanar-type line structure for transmitting a radio frequency signal, similar to claim 35. Claim 38 recites, *inter alia,* the same basic structure as in claim 35, but includes first and second dielectric films, the first one underlying the coplanar conductor layer and the second one being formed so as to cover the coplanar conductor layer. Claim 38 further recites that at least one of the first and second dielectric films contains titanium. This also makes it possible to shorten a line length.

Weigand et al. (hereinafter, "Weigand") shows in Fig. 1G thereof: a metal conductor 18 formed on a substrate; a first composite dielectric layer 24 covering the metal conductor 18; a second metal conductor 40 formed on the first composite dielectric layer 24; a second composite dielectric layer 24' covering the second metal conductor 40; and a tungsten plug 34 electrically connecting the metal conductor 18 and the second metal conductor 40. Further, Weigand teaches each of the first and second composite dielectric layers 24, 24' includes a spin-on-glass (SOG) dielectric layer 20, 20' and a diamond layer 22, 22'.

Furthermore, Weigand totally fails to disclose a micro-strip structure. At best, Weigand may disclose a wiring structure which is remotely similar to claimed structure in that two metal conductors are opposite to each other with a dielectric film composed of two dielectric portions interposed therebetween. As such, the structure of Weigand can not possibly function as a

micro-strip line. For example, Weigand fails to disclose the claimed invention at least in that Weigand's metal conductor 18 and the second metal conductor 40 are electrically connected to each other via the tungsten plug 34. This means that the metal conductor 18 cannot be grounded, which does not allow the structure to function as a micro-strip line. In short, Applicant respectfully submits that the invention of Weigand is irrelevant to a micro-strip line structure for transmitting a radio frequency signal. In contrast, the conductor layer is grounded in the claimed structure.

With respect to claims 35 and 38, Applicant respectfully submits that it is in error to read that the three lines of the second metal conductors 40 of Weigand form a coplanar conductor layer as asserted in the Office Action rejection. Each of the three second metal conductors 40 is connected with a wiring layer at another level via the tungsten plug 34. In such a structure of Weigand, even if the outermost one of the three second metal conductors 40 could be grounded, it would be difficult, if not impossible, to perform impedance control of the other metal conductor 40 so as to make it function as the conductor line for transmission of a radio frequency signal. Furthermore, Weigand does not teach that the composite dielectric layer 24, 24' comprises titanium, or has a dielectric constant larger than 10. Accordingly, Applicant respectfully submits that Weigand cannot produce the same advantages attained from present claims 35 or 38.

As noted above, the device shown in Weigand cannot function as a micro-strip line structure or a coplanar-type line structure for transmission of a radio frequency signal. Weigand simply discloses a typical multilayered wiring structure comprising metal.

It is additionally noted that the problem to be solved by Weigand is that the inclusion of an interlayer insulating film of SOG, which has a relatively low dielectric constant and thus a relatively small thermal conductivity coefficient, reduces the degree of heat dissipation, as taught in column 1, lines 32-38. To solve this problem, Weigand employs a two-layered structure of the SOG dielectric layer 20, 20' and the diamond layer 22, 22', for an interlayer insulating film (i.e., the composite dielectric layer 24, 24'). As known, diamond has an extremely large thermal conductivity coefficient. The explicit purpose of Weigand is to improve heat dissipation, and Weigand has no concern about electromagnetic interaction which is required for transmission of a radio frequency signal.

As for Bartelink, Bartelink shows in Fig. 3A an air-dielectric transmission line 300 which comprises: a membrane-like structure 306 formed on a substrate 308; a plurality of conductive transmission lines 302 formed on the membrane-like structure 306, spaced apart from each other; and a plurality of support members 310a formed between the substrate 308 and the membrane-like structure 306 for supporting the conductive transmission lines 302. Bartelink further discloses air pockets 316 between the plurality of the support members 310a, to reduce a capacitance of a region under each of the conductive transmission lines 302, thereby suppressing charge concentration on a portion where a border between metal and an insulating layer exists.

Bartelink may teach two dielectric portions (310a and 316) having mutually different dielectric constants. However, like Weigand, Bartelink has no concern about electromagnetic interaction or the transmission of a radio frequency signal. It should be noted that Bartelink includes the support members 310a and the air pockets 316 in order to attain an object of reducing a capacitance of a typical wiring structure. Bartelink neither teaches nor suggests controlling the dielectric constants of the air pockets 316 and the support members 310a, to control an impedance of the conductive transmission line 302. Accordingly, there is no motivation for providing a ground plane for microwave circuits between the substrate 308 and the support members 310a.

As for Wakimoto et al. (hereinafter "Wakimoto"), this reference is relied upon by the previous Office Action as teaching the coplanar-type line structure of the present invention. Wakimoto shows in Figs. 1-5: a high-speed signal transmission line 26 connecting a main circuit section 14 and an external connection pad 28a; a power-supply wiring layer 18 formed in a capacitance section 16 which surrounds the main circuit section 14; and a grounding wiring layer 20 formed under the power-supply wiring layer 18 with an insulative layer 30 of silicon dioxide interposed therebetween.

Applicant respectfully submits that it is in error to read that a conductor line 36-2 under the insulative layer 30 and grounding wiring layers 20a, 20b as shown in Fig. 4 of Wakimoto form the coplanar conductor layer as claimed. As clearly taught in column 2, lines 39-43 and in Fig. 2 of Wakimoto, the conductor line 36-2 is simply a bypass connection line for establishing electrical connection between portions 18a, 18b of the power-supply wiring layer 18, using holes 34-2 and 32-2. Furthermore, the insulative layer 30 is composed of silicon oxide which has a relatively small dielectric constant.

Moreover, the configuration of Wakimoto at an upper level also differs from the claimed coplanar conductor layer at least in that the power-supply wiring layer 18 surrounds the main circuit section 14, instead of extending along the conductor line as set forth in the claimed invention.

In view of the foregoing, Applicant respectfully submits that Weigand, Bartelink, Wakimoto, and/or any combination thereof, could not render the presently claimed invention obvious.

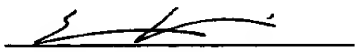
II. CONCLUSION

In view of the foregoing, Applicant respectfully submits that the application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact Applicant's undersigned attorney at the telephone number listed below.

Respectfully submitted,

NIXON PEABODY LLP



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